

### REMARKS

Entry of the amendment is respectfully requested. The amendments address typographical errors. Reconsideration is respectfully requested in light of the foregoing amendments and remarks which follow. The Examiner's position that an appeal will be required to advance prosecution is noted as is the Examiner's observation concerning the prolonged prosecution.

Claims 7, 8 and 13-18 are pending.

Claims 17 and 18 have been amended to address typographical errors.

It is also respectfully requested, that the finality of the last Office Action be withdrawn. A new ground of rejection was included. The Mangold et al reference ('944 Patent), newly cited, was included in the statement of rejection.<sup>1</sup>

Claim 17 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. Applicants respectfully traverse.

It is believed that there is implied support for the potassium oxide as a dopant. The metal component, potassium, is clearly identified within the specification as filed. See the last paragraph on page 10. It is also exemplified in Example 3. The salt form is mentioned in Table 2.

It is clear that the dopant may be in a salt or oxide form. The Examiner's attention is directed to page nine, second complete, of the specification as filed where the doping component is described generally as "a metalloid and/or metal or a metalloid salt and/or metal salt or an oxide of a metal and/or metalloids ... 5 and 600 m<sup>2</sup>/g." See also the third paragraph on page 11.

Also consider, relative to the artisan of ordinary skill and their expected perceptions: Dopant is generally understood to mean the substance which is used to obtain the metal oxide particles containing the doping component. While a dopant is an oxidizable and/or hydrolysable

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<sup>1</sup> Mangold et al. appears to correspond to CA 2,223,377, which was of record, applied by the Examiner and overcome. Please note that certain of the method and product claims were found allowable in 2006. The merit of citing another member of the CA 2,223,377 family merely prolongs prosecution and results in piecemeal prosecution.

metal compound, the doping component is as a rule an oxide of a metal. See WO 2007/054412. Also, the previously submitted Rule 132 Declaration shows that the salt form gives rise to the oxide.

Accordingly, it is submitted that it is clear that Applicants were in possession of the oxide form of potassium.

Withdrawal of the rejection is respectfully requested.

Claims 8 and 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mangold et al (JP 2000-169132) in view of Wypych (Chapter 6 of the Handbook of Fillers, second edition), Herzig (US 4,101,499), Penneck (US 4,001,128) and Cyprien Guy et al. (US 4,866,661). Applicants respectfully traverse.<sup>2</sup>

The rejected claims are directed to reinforcing filler compositions. The preamble specifies the composition use and would include any materials associated with that use and the body of the claim specifies a functional amount. The patentability inquiry reflected in the Office Action(s), has focused only on the surface-modified, aerosol doped-pyrogenically produced oxides, specifically, the silanization of aerosol doped-pyrogenically produced metal or metalloid oxides as defined in claim 15. The dopants considered have as metal components: cerium, aluminum, potassium. These metals are either free metals, salts or oxides. The claimed pyrogenically produced oxides include: SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, TiO<sub>2</sub>, B<sub>2</sub>O<sub>3</sub>, ZrO<sub>2</sub>, In<sub>2</sub>O<sub>3</sub>, ZnO, Fe<sub>2</sub>O<sub>3</sub>, Nb<sub>2</sub>O<sub>5</sub>, V<sub>2</sub>O<sub>5</sub>, WO<sub>3</sub>, SnO<sub>2</sub> and GeO<sub>2</sub>. Silanization has been considered in the context of the selection and use of: octyltrimethoxysilane (Si 108), hexamethyldisilazane (HMDS), polydimethylsiloxane (PDMS) and  $\gamma$ -aminopropyltriethoxysilane (AMEO).<sup>3</sup> The advantages associated with the silanized, aerosol doped-pyrogenically produced oxides are described in the final paragraph on page 13- able to be worked into organic systems, e.g. polyester resins, more

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<sup>2</sup> Applicants' comments are based on U.S. Published Application No. 2003/0185739. A request for the translation identified in a previous office action was made but was never supplied by the Office.

<sup>3</sup> Claim 13 specifies the dopant of claim 15 as aluminum oxide and the pyrogenically produced oxide as silica. Claim 17 specifies the dopant of claim 15 as potassium and the pyrogenically produced oxide as silica. Claim 8 specifies the silanizing agent as octyltrimethoxy silane.

rapidly and in higher concentrations. A Rule 132 Declaration, previously submitted, provides a comparison between the claimed surface-modified, aerosol doped-pyrogenically produced oxides and the doped-pyrogenically produced oxides. See Table 5 on page 7 of the Declaration. Also the declaration describes unexpected properties. See Table 6 and discussion which follows on pages 7 and 8.<sup>4</sup>

The Examiner ignores certain claim limitations, e.g. “amounts”, and “rapidly dissolving reinforcing filler composition” and focuses only on aerosol doped-pyrogenically produced oxide of Mangold et al. as an educt and then proceeds to suggest its modification to render it unsuitable for its intended purpose. Mangold et al. desires a hydrophilic surface, presumably for all the taught applications. The exemplified aluminum oxide doped pyrogenically produced silica is designed for inkjet printer applications. The secondary references appear to be selected based on Applicants’ specification since they are directed to the creation of a hydrophobic silica surface.

There is no problem apparent in the first reference that suggests the need for a hydrophobic surface. The secondary references do teach reactions where hydroxyl groups on a silica surface are reacted with silane coupling agents thereby causing a hydrophobic surface to be formed. The rationale employed by the Examiner appears to be ignore the intent of the reference and then employ an obvious to try rationale. It is not seen why one of ordinary skill would wish to ignore Mangold et al.’s teachings. The fact that would could does not address why. Mangold et al. clearly wants a hydrophilic surface for all their taught applications.

Mangold et al. teach a hydrophilic, pyrogenically produced silicon dioxide doped with aluminum oxide suitable for use in the production of inkjet paper or films. It is characterized as being readily dispersible in polar media, such as water. See paragraph [007]. Other uses are

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<sup>4</sup>The Examiner suggests the results would be expected and cites six patents in support of this.<sup>4</sup> None of the documents mention doped, surface modified pyrogenically produced oxides. The documents do not establish a structure activity correlation. The documents are so dissimilar that one would be hard pressed to correlate the inherent presence of a property. Therefore, their probative value is not clear without more explanation. The patents merely show the existence of certain traits. Caradori et al. (US 6,288,143) show “tear resistance”. Eguchi et al (US 5,739,199) show an optically transparent organosiloxane resin composition. Bergstrom et al. (US 6,384,125) show improvements in tear resistance. Burns (US 6,051,672) show improvements in aggregation. Canpont (US 6,462,104) shows improvements in tear strength. Lutz et al. (4,344,800) show improvement in tear resistance and tensile strengths. None deal with a doped metal oxide with or without a silane modified surface.

mentioned in paragraph [0015] but are not exemplified. A fair reading of Mangold et al. also suggests that Mangold et al. want a hydrophilic surface for these applications too.

Wypych (Chapter 6 of the Handbook of Fillers, second edition) is a general text dealing with fillers. The Examiner's description of the content relied upon is accurate.

Herzig (US 4,101,499) teaches a process for the homogeneous distribution of highly dispersed active fillers with a BET surface area of at least  $50\text{m}^2/\text{g}$  in polyorganosiloxanes. The silica surface is modified with organosilicon compounds, e.g. hexamethyldisilane. See col.4 and 5. The fillers include pyrogenic silica, aluminum oxide and titanium oxide. The use or need dopants is not mentioned.

Penneck (US 4,001,128) teaches a filler system for polymers which provides high voltage insulation. The filler system utilizes a combination of alumina trihydrate and a chemically treated silica fiber. The chemically treated fillers are prepared by treating inorganic silicon containing filler with one or more silanes, e.g. octamethyl tetracyclosiloxane. See col. 2 and 3. A monolayer is formed. Porosity is reduced or eliminated. AEROSIL R972 is mentioned. Again, the use or need for dopants is not mentioned.

Guy et al. (US 4,866,661) teach a heat-vulcanized silicon dosage form. The composition makes it possible to distribute (release) a controlled and measured amount of iodine to treat deficiencies. See col. 2. Reinforcing silica fillers are taught. For the purposes of the patent the silicas can be incorporate as such or treated with silanes prior to incorporation. Pyrogenic silica is mentioned See col. 8.

Mangold et al do not express a desire for a hydrophobic surface. Apparently, the Examiner does and assembles the secondary references and proceeds to suggest that the hydroxyl group will react with the silane coupling agent and since it can, the claimed invention would have been obvious.

Mangold et al. would probably question this since such a modification renders the taught product unsuitable for use in a polar medium, a requirement for the inkjet printer application.

Further, if one wished to consider the Mangold et al product out of the context in which it appears, one would need to select out of a myriad of possibilities those specific surface modifying agent(s) required by claim 15: octyltrimethoxysilane (Si 108), hexamethyldisilazane (HMDS), polydimethylsiloxane (PDMS),  $\gamma$ -aminopropyltriethoxysilane (AMEO) and mixtures thereof. The secondary references relied upon by the Examiner do not aid in the selection process relative to the goal achieved. The goal- desirable and unexpected traits shown in the Rule 132 Declaration- is not described in the applied references relative to a modifying agent.

In claim 15, the dopant can be one of three metals. These too have to be selected. The secondary references relied upon do not aid in this regard. There is no teaching. The Rule 132 declaration shows where potassium is the dopant the filler of the invention can be used at high concentrations not possible with nonsilanized doped silicas. There are advantages described and established by the declaration. The selection of the metal component involves more than serendipity.

It would appear that a proper prima facie case as to the selection of the surface modifying agent and dopant has not been established. Further, the proposed modification of the primary reference renders it unsuitable for its intended purpose. This has long been held as improper. Also, claim limitations are ignored. Further, the substance of the Rule 132 declaration is not being given its true weight, either as a showing of unexpected results or step or component criticality. The Examiner's citation of patents showing properties, e.g. transparency, tear resistance, etc., in unrelated systems does not suggest that the disclosed traits in the instant system would be expected in kind and quantity.

Withdrawal of the rejection is believed to be in order.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hemme et al. (US 2002/001871) in view of Wypych (Chapter 6 of the Handbook of Fillers, second edition), Herzig (US 4,101,499), Penneck (US 4,001,128) and Cyprien Guy et al. (US 4,866,661). Applicants respectfully traverse.

Hemme et al teach a pyrogenically produced titanium dioxide doped by means of an aerosol. The dopants include, aluminum oxide, platinum oxide, magnesium oxide, and zinc

oxide. Titanium oxide is used as a photocatalyst or UV absorber. There is no mention of surface modification treatment to render a hydrophilic surface hydrophobic. There is mention of a use in plastics or coatings. See paragraphs [0023] and [0024]. The exemplified uses are in aqueous or acidic environments. Hemme et al. do not teach a use as a reinforcing filler.

The secondary references do not remedy the deficiencies of the primary reference.

Accordingly, the teachings of the references, taken alone or in combination, are incomplete to suggest the invention as claimed.

The examiner appears to be of the opinion that the mere showing of the existence of specified chemical reactions renders their application in a specified manner "obvious".

A proper prima facie case of obviousness has not been established. Withdrawal of the rejection is respectfully requested.

Claim 7 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mangold et al (JP 2000-169132) in view of Wypych (Chapter 6 of the Handbook of Fillers, second edition), Herzig (US 4,101,499), Penneck (US 4,001,128) and Cyprien Guy et al. (US 4,866,661) and also in view of Lentz (US 3,122,520). Applicants respectfully traverse.

Mangold et al (JP 2000-169132), Wypych (Chapter 6 of the Handbook of Fillers, second edition), Herzig (US 4,101,499), Penneck (US 4,001,128) and Cyprien Guy et al. (US 4,866,661) are discussed above. None of these references teach a series of steps like those required by claim 16. None of these references teach the material to be treated.<sup>5</sup>

Claim 16 describes a method for producing an aerosol doped, surface-modified pyrogenically produced oxides where 1) an aerosol doped-pyrogenically produced oxides is placed in a suitable mixing container, 2) the oxides are sprayed with water and/or acid and then 3) the water and/or acid treated oxides are sprayed under intensive mixing conditions where oxygen is excluded with the surface-modification reagent or a mixture of several surface-modification reagents to form the aerosol doped, surface-modified, pyrogenically produced

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<sup>5</sup> The aerosol doped-pyrogenically produced oxide has a BET surface area between 40 and 217 m<sup>2</sup>/g where the dopant is homogeneously distributed within the pyrogenically produced oxide. The metal component of the dopants is specified as cerium, aluminum, potassium. The dopant is further characterized as a salt or oxide. The pyrogenically prepared metal or metal oxide is SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, TiO<sub>2</sub>, B<sub>2</sub>O<sub>3</sub>, ZrO<sub>2</sub>, In<sub>2</sub>O<sub>3</sub>, ZnO, Fe<sub>2</sub>O<sub>3</sub>, Nb<sub>2</sub>O<sub>5</sub>, V<sub>2</sub>O<sub>5</sub>,

oxides. The surface modification reagent or a mixture of several surface-modification reagents are limited to octyltrimethoxysilane (Si 108), hexamethyldisilazane (HMDS), polydimethylsiloxane (PDMS),  $\gamma$ -aminopropyltriethoxysilane (AMEO) and their mixtures.<sup>6</sup>

Lentz teaches silanization of silica prior to use as a reinforcing filler silicone rubber. The preparatory process is taught in the Examples and in col. 2-3.7 The essential steps appears to be heating a silica hydrosol under strong acid conditions (pH 0, .3, 1.7) prior to reacting the gel with the organosilicon compound.

It is clear that Lenz, like the other references included in the statement of rejection, does not teach the treated material. Lentz does not teach the steps or their sequence. Lenz does not teach the exclusion of oxygen. The step sequence as shown in the Rule 132 declaration, previously submitted, shows beneficial properties result from the performance of the steps as claimed. The additional steps required by claim 7 are also not taught by Lenz- re-mixing step for 15 to 30 minutes and tempering at a temperature of 100 to 400°C for a period of 1 to 6 hours.

The mentioning in Herzig of water and silane coupling agents gives does not give rise to a suggestion of the step sequence as claimed. There is no teaching of the exclusion of oxygen or air also required by the claims. It would appear that the art is not suggestive of the claimed method or its results.

The art is incomplete in its teachings relative to the claims. A prima facie case of obviousness has not been established. Withdrawal of the rejection is respectfully requested.

Claims 8 and 13-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mangold et al. (US 6,328,944) in view of Wypych (Chapter 6 of the Handbook of Fillers, second edition), Herzig (US 4,101,499), Penneck (US 4,001,128) and Cyprien Guy et al.

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WO<sub>3</sub>, SnO<sub>2</sub> or GeO<sub>2</sub>.

<sup>6</sup> Claim 7 further limits claim 16 by including the additional steps of re-mixing the surface modification agent(s) and the aerosol doped, surface-modified, pyrogenically produced oxides for 15 to 30 minutes and tempering at a temperature of 100 to 400°C for a period of 1 to 6 hours. Claim 14 further limits claim 16 by specifying the dopant as aluminum oxide and the pyrogenically produce oxide as silica. Claim 18 further limits claim 16 by specifying the dopant as potassium and the pyrogenically produced oxide as silica.

<sup>7</sup> The silanized silica increase tensile strength. An operable surface area range for the silica is taught. See col.2 and 3. Fume silicas are mentioned. Suitable organosilanes are taught in col. 4.

(US 4,866,661). Applicants respectfully traverse.

Mangold et al. (US 6,328,944) appears to correspond to CA 2,223,377, earlier cited and overcome, as to the method claims and the subject matter of claim 13. The earlier presented arguments are incorporate herein by reference.

Wypych (Chapter 6 of the Handbook of Fillers, second edition), Herzig (US 4,101,499), Penneck (US 4,001,128) and Cyprien Guy et al. (US 4,866,661) are discussed above.

Mangold et al. teach a doped, pyrogenically prepared oxides of metals and/or non-metals which are doped with one or more doping components in an amount of 0.00001 to 20 wt. %. The doping component may be a metal and/or non-metal or an oxide and/or a salt of a metal and/or a non-metal. The BET surface area of the doped oxide may be between 5 and 600 m<sup>2</sup>/g. The doped pyrogenically prepared oxides of metals and/or non-metals are prepared by adding an aerosol which contains an aqueous solution of a metal and/or non-metal to the gas mixture during the flame hydrolysis of vaporizable compounds of metals and/or non-metals. There is no mention of hydrophobic surfaces. There is no mention of a silanization process. Possible uses for the doped, pyrogenically prepared oxides of metals and/or non-metals are set forth in the paragraph starting at line 26 in col. 3. None are exemplified.

The use of potassium and cerium salts as dopants are exemplified. See examples 2, 4 and 5, respectively. Experimental conditions are summarized in Table 1. Analytical data is summarized in Table 2.

With regard to method claims 14, 16, and 18, there are no teachings in the references, taken alone or in combination, which suggest the three step process as claimed. Note the arguments above. Also it is noted that Lenz is not included in the statement of rejection. It is not clear if that is intentional. The other references are less relevant. The criticality of the steps is evident from the Rule 132 declaration, previously submitted.

As to the method claims, the references relied upon do not establish a proper prima facie case. The teaching are in complete relative to the claims. Withdrawal of the rejection is respectfully requested.

With regard to product claim 13, the claim requires an aluminum oxide dopant, which is not taught or suggested in any one of the references. Withdrawal of the rejection as to this claims is respectfully requested due to the incompleteness of their teachings.<sup>8</sup>

With regard to product claim 17, which is more closely directed to the reactants employed in the previously submitted Rule 132 Declaration, there are some additional selections that need to be made- silane surface modification, silica as the metalloid oxide and potassium as the dopant. Further, in considering the propriety of the prima facie case, the unexpected results need to be considered. The relevancy of the patents cited by the Examiner relative to the unexpected nature of the results achieved is discussed above. Accordingly, withdrawal of the rejection of claim 17 is respectfully requested.

With regard to product claims 8 and 15, the arguments presented above are equally applicable here. In applying Mangold et al ('944), the Examiner ignores claim limitations. Mangold et al. ('944) desires hydrophilic surfaces for the applications taught. The proposed modification renders the reference product unusable for Mangold et al.'s purposes. Mangold et al. apparently deemed the hydrophilic property critical. Further, considering only the surface-modified doped pyrogenically prepared metal oxide component of the composition, one would need to make selections as to the surface modifying agent. The secondary references provide no guidance in that regard. This is especially true when one considers the Rule 132 Declaration.

A proper prima facie case of obviousness has not been established as to claims 8 and 15. Withdrawal of the rejection is respectfully requested.

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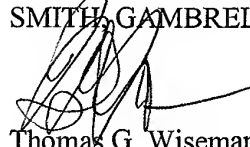
<sup>8</sup> Not all dopants and metal oxides would be expected to function the same. Note US 6,855,635 B2, US 6,676,719 B2, US 6,328,944, US 2008/0311291 A1, and US 2009/0087496 A1.

### CONCLUSION

All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Therefore, it is respectfully requested that the Examiner reconsider all presently outstanding rejections and that they be withdrawn. It is believed that a full and complete response has been made to the outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

It is not believed that extensions of time are required, beyond those that may otherwise be provided for in accompanying documents. However, in the event that additional extensions of time are necessary to prevent abandonment of this application, then such extensions of time are hereby petitioned under 37 C.F.R. 1.136(a), and any fees required therefor are hereby authorized to be charged to **Deposit Account No. 02-4300, Attorney Docket No. 032301.606.**

Respectfully submitted,  
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